

Regular Hospital Infection Control Team Rounds - A Prime Factor in Early Detection of NICU Outbreak

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1. Introduction

Hospital acquired infection is increasing day by day in all kinds of set - ups. Amongst the different pathogens *Acinetobacter* is one of the important owing to its great ability to survive on all kind of environmental surfaces [3] for long time there by increasing probability of cross infection & outbreaks.

Acinetobacter baumannii has emerged worldwide as an important hospital - acquired infection (HAI) causing pathogen. [1, 2] *A. baumannii* can colonize the human skin and gastrointestinal tract and thereby can cause HAIs more easily. [4–6] Neonates admitted to Neonatal Intensive Care Unit (NICU) are at increased risk of contracting HAIs due to their immature immune system and frequent invasive manipulations. [7–9] Bloodstream infections (BSIs) caused by *A. baumannii* occur primarily in premature low - birth - weight infants. [8] In various studies related to surveillance of device - associated HAIs in a NICU *A. baumannii* has been described as the main cause of device - associated HAIs. [10]

HAIs outbreaks are associated with higher mortality, morbidity and increased hospital costs. [11–13] Surveillance of HAIs is essential for detection and containment of the outbreaks. [11, 14–20]

In this report, we describe how an implementation of the HAIs surveillance system for the first time in a NICU in tertiary care hospital led to the rapid detection of an outbreak of *A. baumannii*. The objective of this report is to summarize the investigation and restriction of outbreak like situation with the help of multi - modal infection control interventions.

2. Methodology

A Prospective and regular hospital infection control round was initiated by Hospital infection control team in the hospital. During rounds BSI outbreak like situation was noticed in neonates. A case (infected infant) was defined as any patient hospitalized in the NICU during the outbreak period, with clinical signs of septicemia or other clinical sign and isolation of *A. baumannii* from Blood. Colonization was rule out. To study it thoroughly all blood samples of admitted babies were send to department of microbiology. Hospital infection control team monitored infection control practices and protocol on daily basis as per the specially designed checklist.

Ours is a 650 bedded teaching hospital providing tertiary - care to patients including neonates. The Neonatal Intensive Care Unit (NICU) with twenty intensive care beds is providing care to all kinds of critically ill neonates including the ones referred from outside as well as transferred from Labour ward. NICU is divided into three sections: stable and under observation: - seven beds, weight gain monitoring: - ten beds and high dependency unit: - three beds unit. In early 2019 active comprehensive neonatal HAI surveillance system was adapted and introduced in the NICU. Blood samples were processed using Liquoid broth by manual method with subcultures on 24hrs, 72hrs and on 5th day. All lactose non - fermenter colonies were inoculated on Triple sugar iron agar, and Simmons citrate agar. All non - fermenting pathogens were identified using biochemical reactions like oxidase, catalase, fermentation of sugar, motility, 10% lactose fermentation, colony characters and reported as *A. baumannii - complex*.

Antimicrobial susceptibility testing was performed by disk - diffusion method as recommended by The Clinical & Laboratory Standards Institute (CLSI) for trimethoprim - sulfamethoxazole, Amikacin, Gentamicin, Imipenem, Ceftazidime, Piperacillin - tazobactam, Piperacillin, Ampicillin - sulbactam.

Environmental investigation

Environmental specimens were collected from multiple high - touch surfaces in the NICU e. g. ventilator screen, monitors, medical devices, intubation equipment, feeding equipment e. g. bottles, feeding mixtures, hands of the healthcare workers and environment in the ward e. g. room air, tap aerators, o₂ humidifier, water, disinfectant containers. The air conditioning system and patient ventilators being commonest source of nosocomial pathogen, these were assessed, disassembled, and cultured, to exclude *A. baumannii* transmission considering that all neonates admitted to the NICU are referred from various facilities especially outside ones.

All *A. baumannii* isolates in the NICU had the same resistance pattern being resistant to trimethoprim/ sulfamethoxazole, piperacillin, and gentamicin, resistant to imipenem, piperacillin/ tazobactam, ceftazidime, trimethoprim/ sulfa - methoxazole.

Infection control interventions

In first week September 2019, after the detection of the outbreak, environmental assessment in the NICU was done and recommendations for patient and ward area improvement according to the IPC protocols were developed. The IPC team controlled adherence to the

infection control measures during regular meetings with the NICU staff. Hand hygiene was intensified and educational workshops held for doctors and nurses; invasive procedures (intubation, central vascular catheterization (CVC), feeding with a nasogastric tube, parenteral feeding) were reviewed.

Patient documentation was shifted from the patient area; each patient's zone was equipped with individual equipment; area for feeding and milk preparation was clearly demarcated.; taps were removed and cultured. The infection control nurse trained the NICU nursing staff in invasive manipulations and all neonatal care related procedures.

Mothers as well as accompanying relative were also trained e. g. nipple cleaning, cleanliness of feeding utensils, etc. The parenteral feeding mixture preparation guidelines were revised; the enteral feeding procedure was changed – sterile syringe was used before every feeding. Policy on Reuse of single use device was revised - with strict instructions on one time use; and insertion of peripheral venous catheter with utmost sterile precautions was advised.

Staff was strictly instructed not to fill water in incubator humidifiers before the arrival of the patient and keep humidifiers empty and dry. Furthermore, tap water use in humidifier was prohibited.

As infection control interventions were intensified *A. baumannii* rates decreased. In October 2019 *A. baumannii* BSIs incidence was registered to almost nil.

To prevent the recurrence of similar situation in other ICUs workshops were organized on invasive manipulations. No new *A. baumannii* BSI cases were identified for more than six months

3. Follow - Up

Here we report a rapid identification of an outbreak of *A. baumannii* resulting from an HAI surveillance system implementation for the first time in NICU. The formation of the HIC team and implementation of the multimodal infection control program, including thorough cleaning with soap and water and disinfection of the ward, were the key elements to contain the outbreak.

We employed various infection control activities such as hand hygiene workshops, HIC education for the staff and patients' families (Mothers of neonates in NICU), environmental cleaning, etc. These interventions seemed to be effective in reducing *A. baumannii* BSI cases

After the overall assessment, it was noticed that the chances of infection increase when the humidifier water is not changed and used for more than 3 days.

All cultures from the tap and humidifier were positive. The tap water was cultured thrice—since result was positive, taps were replaced.

Profound and thorough cleaning of the ward was described as a strategy in the control of *A. baumannii*. We have described an outbreak in the NICU caused by *A. baumannii*

contained with a multi - modal infection control program, including thorough cleaning protocol for humidifier, hand hygiene, and stringent cleaning and disinfection protocol. Introduction of the HAI surveillance system was a crucial step towards timely identification and control of the outbreak. We conclude that only multi - modal infection control interventions contained the outbreak and could be recommended in similar occasions.

References

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Daily cleaning check list

Name of Ward Month:

Housekeeping and Environment cleaning	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Remark	
1 dry mop - . Floor																																	
2. wet Moping - floor																																	
3. Dusting																																	
4. Bed, Bed side locker																																	
5. IV Stand																																	
6. Patient Trolley																																	
7. Venti																																	
8. suction bottle																																	
9. humifier																																	
10. Monitor																																	
11. wash rooms																																	
12. BMW																																	

Responsible person:
 Supervision In charge:
 Counter check by HICN:
 Remark with date: